PREFACE

The FY 95 Cost Report, Volume 3 - Artillery/Missile Systems, from the Operating and Support Management Information System (OSMIS) data base, is forwarded for your use and comment. OSMIS is a major portion of the Department of Defense (DoD) Visibility and Management of Operating and Support Costs (VAMOSC) Program. OSMIS, managed by the U.S. Army Cost and Economic Analysis Center (USACEAC), is the U.S. Army's source of historical operating and support (O&S) cost information for more than 350 systems deployed in tactical units – Active, Guard, and Reserve.

Department of Defense analysts have found historical O&S data to be useful in projecting O&S costs for future systems, developing O&S cost analyses, and preparing O&S estimates. The types of analyses and comparisons include the following:

- Component Cost Analyses (CCAs),

- Program Office Estimates (POEs),

- Cost Estimating Relationships (CERs),

- Cost and Operational Effectiveness Analyses (COEAs),

- Economic Analyses (EAs), and

- U.S. Army Materiel Command (AMC) Major Subordinate Commands (MSCs) weapon/materiel system O&S cost comparisons to new systems in the acquisition cycle.

This volume contains FY 91-95 historical O&S costs on major fielded weapon/materiel systems as operated within the U.S. Army Major Commands (MACOMs). Data sources used in this report are from the U.S. Army Logistics Support Activity (LOGSA), AMC's MSCs, the Industrial Operations Command (IOC), ODCSOPS, and ODCSLOG. This report was prepared by CALIBRE Systems, Inc., Falls Church, VA.

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TABLE OF CONTENTS

*Section is determined by Equipment Category Code from DA Pam 738-750, Maintenance Management UPDATE 14, 1 August 1994.

SECTION 1. OVERVIEW

1.1   Introduction

The FY 95 Cost Report, Volume 3 - Artillery/Missile Systems is produced from the OSMIS data base. The report presents FY 91-95 Operating and Support (O&S) historical information for 18 artillery/missile systems, which includes costs for the following:

- Class III consumption (POL - Petroleum, Oils, and Lubricants) for operating combustion/turbine engines; however, solid fuels, coal, and related products are excluded,

- Class V consumption (training ammunition only), and

- Class IX consumption (repair parts and components, including kits, assemblies and subassemblies, reparables, and consumables) required for maintenance support of equipment designated for OSMIS tracking and depot/intermediate maintenance costs.

In comparison to previous years reports, this report features additional Class V (Ammunition) cost data that is applicable to specific artillery/missile systems. Annual and five year training ammunition consumption rates are shown at the Department of Defense Identification Code (DODIC), MACOM, and Total Army level of detail.

This volume presents easily locatable reference data that may be used to support analyses when comparing the following:

- Weapon systems summarized costs (including POL),

- MACOM annual OPTEMPOs, Class IX parts (reparables and consumables) costs,

- Total Army five year trend Class IX parts costs, Work Breakdown Structure (WBS), OPTEMPOs,

- Total Army and MACOM Class V annual and five year weapon system consumption rates and costs,

- Depot and Intermediate Maintenance annual and five year weapon system military and civilian labor costs,

- Weapon system annual and five year trends for depot maintenance costs for End Items and Secondary Items,

- Specific National Stock Number (NSN) cost driver detail at the Total Army level for reparables and consumables, and

- Historical Class IX reparable and consumable consumption rates (quantity per system and mile).

The entire FY 95 OSMIS Annual Cost Report consists of seven volumes:

- Volume 1 - Aviation Systems (blue cover) consisting of rotary and fixed wing aircraft,

- Volume 2 - Combat Systems (yellow cover) consisting of tanks and combat vehicles,

- Volume 3 - Artillery/Missile Systems (red cover) consisting of artillery weapons, artillery support vehicles, air defense artillery and missiles, surface-to-surface missiles, and detection systems,

- Volume 4 - Tactical Systems (green cover) consisting of wheeled vehicles,

- Volume 5 - Engineer/Construction Systems (maroon cover) consisting of engineer, construction, electrical power generation, and floating equipment,

- Volume 6a - Communications/Electronics Systems (orange cover) consisting of radio receivers, teletypewriters and terminal sets, switches (voices and message), etc., and

- Volume 6b - Communications/Electronics Systems (orange cover) consisting of communications and data processing systems, radar sets, and terminals, etc.

Each volume contains an overview in Section 1, and the weapon systems cost reports are contained in Section 2. Appendix A provides a general description of the cost report formats, Appendix B contains the description of the WBS structure for the weapon/materiel systems, and Appendix C lists weapon systems in the other six volumes.

1.2   Cost Calculations

To calculate parts' costs, OSMIS extracts Class IX supply demand data from the Logistic Intelligence File (LIF) at the NSN level and then adds the Army Master Data File (AMDF) attributes to the demanded NSNs. The process further identifies a demanded NSN as either reparable or consumable, identifies the weapon system(s) to which an NSN belongs, identifies the support organization which generated the demand for the NSN, distributes these demands at the unit-level weapon/materiel system, and finally develops detailed cost summaries at the MACOM level. The Class IX Total Army costs represent the sum of the MACOM's total number of NSNs demanded (reparables and consumables) and distributed to a weapon system. The quantity demanded is multiplied by the FY 95 AMDF unit price. Net reparable costs are calculated by applying the Army Materiel Command's system technology-oriented "Commodity" Major

Subordinate Commands (MSC) specific credits to NSNs designated as depot level reparables (DLRs). Determining whether an NSN is a reparable or consumable part is explained in Appendix A, Section 6. The "Commodity" MSC-specific credit rates used for Depot Level Reparables (DLRs) during OSMIS processing are shown in the table below:

"Commodity" Major Subordinate Command (MSC) - Specific Credit Rates	
AMC "Commodity" Major Subordinate Command	Credit Rates[*] (Percent (%))
Armament and Chemical Acquisition and Logistics Agency (ACALA)	53.6
Aviation and Troop Support Command, Aviation (ATCOM(A))	56.6
Aviation and Troop Support Command, Troop (ATCOM(T))	54.4
Communications-Electronic Command (CECOM)	51.3
Missile Command (MICOM)	60.9
Tank-automotive and Armament Command (TACOM)	54.7
Defense Logistics Agency/General Services Administration (DLA/GSA)	None
[*] Rates are directed by the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), Mar 95	

Consumables do not receive MSC credits. Surcharges are embedded in the AMDF unit price. All costs shown for years prior to FY 95 are inflated to represent FY 95 constant dollars.
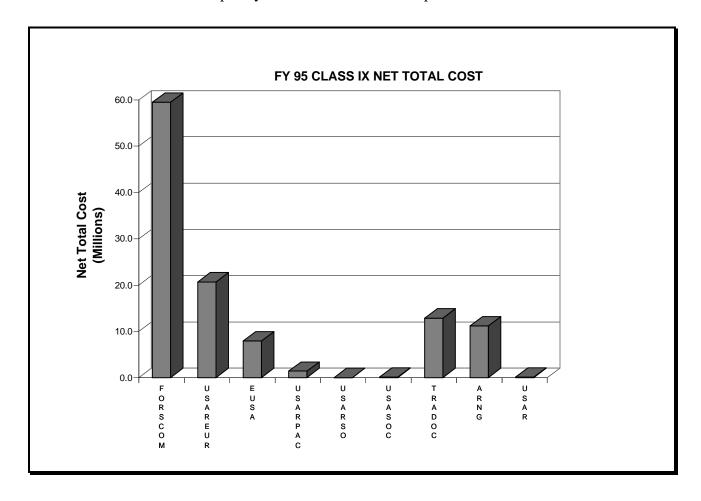
Similar to NSN parts costs, ammunition costs are based on the quantity of demands (identified by the ammunition Department of Defense Identification Code (DODIC)) that are distributed to specific weapon systems. The ammunition total costs are generated from the Training Ammunition Management Information System (TAMIS).

POL costs are calculated using unit prices published by the DoD Fuel Supply Center for FY 95. Total costs are calculated by multiplying POL unit prices by the weapon system's historical consumption rate.

OSMIS extracts and sums military and civilian labor costs from standard Army maintenance management information systems. For depots, OSMIS uses data from the Industrial Operations Command (IOC) Master File Maintenance (MFM) system and data from each of the AMC "Commodity" MSC's Maintenance Data Management Systems (MDMS). For intermediate level maintenance activities, civilian and military labor costs are extracted and summed using data from the Work Order Logistics File (WOLF) and the Army Manpower Cost System (AMCOS).

1.3   MACOM Weapon Systems Costs - A Total Army Look

For FY 95, the OSMIS data base recorded Class IX costs as $113.8 million for Net Reparables and Consumables for the 18 artillery/missile systems.   Net Reparable costs are calculated by summing the results of multiplying reparable NSN quantities by their corresponding Unit Prices with Credit. Unit Prices with Credit are calculated by multiplying the FY 95 unit price by one minus the MSC credit rate (credit rates are shown in paragraph 1.2). The Consumable total annual costs are calculated by multiplying the NSN quantity by the FY 95 unit price - no credits. Net Reparables and Consumables are summed to determine MACOM Net Total Cost. Total Army costs show the sum of the Major Army Commands (MACOMs) Net Reparables and Consumables. The graph and table on the next page display the FY 95 MACOM Class IX Net Total Costs for aviation weapon systems contained in this report.

FY 95 CLASS IX NET TOTAL COST

FY 95 Class IX Net Total Cost ($ in Millions)										
	Major Army Commands (MACOMs)									
	FORSCOM	USAREUR	EUSA	USARPAC	USARSO	USASOC	TRADOC	ARNG	USAR	Total Army
Net Reparables	40.9	13.8	6.1	0.5	0.0	0.0	10.7	5.1	0.0	77.1
Consumables	18.6	6.9	1.8	0.9	0.0	0.1	2.2	6.1	0.1	36.7
Net Total Cost	59.5	20.7	7.9	1.4	0.0	0.1	12.9	11.2	0.1	113.8

The five systems in Volume 3 with the highest Total Army Class IX net total costs in FY 95 are shown below:

Top Five Systems For Class IX Net Total Costs	
($ in Millions)	
System	Net Total Costs
MLRS	28.6
PATRIOT	27.5
M109A5 HOWITZER	14.8
AVENGER	14.7
M981 FIST-V	9.0

SECTION 2

Artillery/Missile Systems

APPENDIX A

Page Formats

This appendix describes the type of information that is provided for each system in Section 2. Each section in this appendix corresponds to a page in the main body of the report. For example, the section below entitled "System Features" explains the type of information provided on the first page for each system.

1.   System Features

The first page for each system contains a system identifiers block, a system description block, and a photograph or drawing of the system. The system identifiers block displays codes and acronyms specific to the weapon/materiel system. The system description block contains a brief statement of the features and capabilities of the system. The photograph or drawing provides a pictorial representation of the system. Terms used in the system identifiers block are explained in Table A-1, System Identifiers Elements.

Elements	Definitions
Nomenclature	A brief weapon/materiel system title
Standard Study Number (SSN)	A six position alphanumeric code indicating either a single item or a group of items
Line Item Number (LIN)	A six position alphanumeric code identifying an end item
National Stock Number (NSN)	A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Army Modernization Information Memorandum Number (AMIM NO)	A four position alphanumeric code indicating force modernization systems and the level of management visibility for that weapon/materiel system
End Item Code (EIC)	A three position alphanumeric code identifying an end item
Fuel Type	A Defense Logistic Agency (DLA) code identifying the type of fuel used by the weapon/materiel system

Table A-1. SYSTEM IDENTIFIERS ELEMENTS

2.   Selected Components LIN List

The top half of the second page for each system contains the weapon/materiel system associated component list. This section is a compilation of major items, along with their LINs and NSNs, that are part of the system as defined by OSMIS. For selected systems, the list is representative in nature (i.e., not all the components or the variations of components are listed).

OSMIS defines a weapon/materiel system as a major end item, such as a MLRS, composed of the following:

- all attached end items configured for use on the major end item, such as special aiming devices and weapons mounted on a MLRS, and

- all peculiar equipment designated to support the major end item, such as system specific test and diagnostic equipment for a MLRS.

OSMIS excludes common tools and test equipment, as well as ancillary support end items (fuel trucks, portable repair shops, direct support tool sets) from the weapon/materiel system definition. The bottom half of the page shows the Mission Design Series (MDS) name, the associated LIN, and the NSN of any system variants. Column headings for the components page are explained in Table A-2, Components & System Variants List Elements.

Elements	Definitions
Line Item Number (LIN)	A six position alphanumeric code identifying an end item
National Stock Number (NSN)	A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Nomenclature	A brief NSN description
Mission Design Series (MDS)	An alphanumeric code assigned to an end item

Table A-2. COMPONENTS & SYSTEM VARIANTS LIST ELEMENTS

3. FY 95 Total Army Cost Summary

The summary page displays Total Army weapon/materiel system costs and other relevant information using MACOM level supporting data that appears on the following pages. Included on this page are Class IX Materiel-Parts costs, activity/density, depot/intermediate maintenance costs, Class III POL costs, and Class V Ammunition costs, as applicable to the weapon/materiel system. Cost averages are calculated using the Total Army costs in each category (except depot and civilian maintenance) divided by the number of systems or the activity. Depot maintenance averages are based on total costs divided by the quantity of maintenance actions completed. Intermediate maintenance averages for military and civilian labor costs/labor hours are calculated by dividing the sum of the labor costs/labor hours by the number of systems or the activity. Cost summary data and cost elements are explained in Table A-3, FY 95 Total Army Cost Summary Data and Cost Elements.

Data/Cost Elements[*]	Explanations
Activity/Density	Miles - Activity recorded in the Army Maintenance Management System - Expanded Database (TAMMS-EDB)
	Number of systems - Densities are extracted from the Continuing Balance System-Expanded (CBS-X)
	OPTEMPO (Operating Tempo) - The activity divided by the number of systems
Class III-POL (5.05)	The total cost of POL based on the weapon/materiel system fuel and oil consumption rates
Class V-Ammunition (2.11)	The cost of training ammunition to the weapon/materiel systems
Class IX Materiel-Parts (5.04/5.03)	The consumable and net reparable Class IX total costs for a weapon/materiel system and includes an average cost per system and per mile
Depot End Item Maintenance (5.061)	The OMA total cost of end item maintenance completed at depot level including an average cost per end item, and procurement costs
Depot Secondary Item Maintenance	The total cost of secondary item maintenance completed at depot level including an average cost per secondary item
Intermediate Maintenance	DS/GS - The total cost of military labor including average costs per system and per mile and average maintenance labor hours per system and per mile
	Civilian - The total cost of civilian labor for FORSCOM and TRADOC only, which includes average costs per system and per mile and average maintenance labor hours per system and per mile
[*] The numbers in parentheses refer to cost elements associated with a fielded system.	

Table A-3. FY 95 TOTAL ARMY COST SUMMARY DATA AND COST ELEMENTS

4. FY 95 MACOM OPTEMPO

This page shows the FY 95 MACOM weapon/materiel system activity (miles). Column headings are explained in Table A-4, FY 95 MACOM OPTEMPO Elements.

Elements	Explanations
MACOM Code	Major Army Command-Code
MACOM Name	Major Army Command-Name
Activity (Miles)	The activity, measured in miles for combat systems, are extracted from the Army Maintenance Management System - Expanded Database (TAMMS-EDB)
Number of Systems	The densities are extracted from the Continuing Balance System-Expanded (CBS-X)
OPTEMPO	The activity divided by the number of systems

Table A-4. FY 95 MACOM OPTEMPO ELEMENTS

The MACOM codes, acronyms, and names recorded by OSMIS are explained in Table A-5, MACOM codes, acronyms, and names.

MACOM Codes	MACOM Acronyms	MACOM Names
FC	FORSCOM	Forces Command
E1	USAREUR	U.S. Army, Europe
P8	EUSA	Eighth U.S. Army
P1	USARPAC	U.S. Army, Pacific
SU	USARSO	U.S. Army, South
AO	USASOC	U.S. Army Special Operations Command
TC	TRADOC	Training and Doctrine Command
NG	ARNG	Army National Guard
AR	USAR	U.S. Army Reserve
TA	Total Army	Data summed for the above listed MACOMs comprises the "Total Army"

Table A-5. MACOM CODES, ACRONYMS, and NAMES

5.   Five Year Total Army OPTEMPO

This page shows the Total Army averages for five consecutive fiscal years. The graph shows the Total Army average OPTEMPO for each Fiscal Year. The OPTEMPO table column headings are explained in Table A-4, FY 95 MACOM OPTEMPO Elements.

6.   FY 95 MACOM Class IX Costs

Class IX reparable and consumable definitions are based on the Army implementation of DMRD 904C. A reparable, referred to as a Depot Level Reparable (DLR), is a designated or selected secondary item on which repairs can be performed at the depot or a Specialized Repair Activity (SRA). The reparable is identified using two Army Master Data File (AMDF) attributes: the Maintenance Repair Code (MRC) equal to 'D' or 'L'; or the MRC equal to 'F', 'H', or 'O' with an Automatic Return Item (ARI) code equal to 'C', 'E', 'R', or 'S'. All other Class IX items are referred to as consumables.

This page shows the FY 95 Class IX costs by weapon/materiel system, MACOM, and Total Army. The graph on this page shows the demand costs by consumables, reparables, and net reparables. Net reparables are calculated in two steps. First, an NSN's AMDF unit price (UP) with credit is calculated by multiplying the NSN's FY 95 AMDF UP without credit by one minus

the FY 95 ODCSLOG-provided MSC-specific reparable credit rate. Second, the extended cost for each NSN is calculated by multiplying the AMDF UP w/credit by the quantity of NSN demands.

The NET REPS are the sum of reparable NSNs' extended costs with credit. The NET TOTAL COSTS are the sum of the CONS and NET REPS. The table below the graph displays the costs depicted by the bars in the graph. The table includes an average cost per system and an average cost per mile column for each MACOM. The FY 95 MSC-specific reparable credit rates are shown in Table A-6, FY 95 MSC-Specific Reparable Credit Rates.

MSC	*FY 95 MSC-Specific Reparable Credit Rates	First Position of the MATCAT
ACALA	53.6	D, M
ATCOM(A)	56.6	H
ATCOM(T)	54.4	B
CECOM	51.3	G
MICOM	60.9	L
TACOM	54.7	K
DLA/GSA	None	E, F, J, Q, R, S, T, U
*Rates are directed by the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), as of Mar 95.		

Table A-6. FY 95 MSC-SPECIFIC REPARABLE CREDIT RATES

The column headings are explained in Table A-7, FY 95 MACOM Class IX Cost Elements.

Elements	Explanations
MACOM Code	Major Army Command-Code
MACOM Name	Major Army Command-Name
Cons	The total extended cost for consumables
Reps	The total extended cost with out credit for reparables
Net Reps	The total extended cost with credit for reparables
Net Total Costs	The total extended cost for cons and net reps
Avg Per System	The net total costs divided by the number of systems
Avg Per Mile	The net total costs divided by the activity

Table A-7. FY 95 MACOM CLASS IX COST ELEMENTS

7.   Five Year Total Army Class IX Costs

This page shows aggregate costs for MACOMs that represent the Total Army costs for five consecutive fiscal years. The graph shows the costs for consumables, reparables, and net reparables which are detailed in the cost table. The column headings are explained in Table A-7, FY 95 MACOM Class IX Cost Elements.

8.   FY 95 Total Army Work Breakdown Structure Costs

This page provides a table showing the FY 95 Total Army Work Breakdown Structure (WBS) Costs for Class IX Materiel-Parts. The WBS structure for artillery/missile systems shown in this table are described in Appendix B. The table includes the total cost of consumables (CONS), reparables (REPS), and net reparables (NET REPS), average cost per system (Avg Per System), and average cost per mile (Avg Per Mile). The NET REPS calculations are explained in paragraph 6. The last row of the table shows the totals for each of the cost columns, a Total Army average per system, and a Total Army average per mile. The Total Army average per system is calculated by dividing the net total costs by the Total Army number of systems. The Total Army average per mile is calculated by dividing the net total costs by the Total Army activity. The column headings are explained in Table A-8, FY 95 Total Army Work Breakdown Structure Costs Elements.

Elements	Explanations
WBS	A two position alphanumeric code identifying Work Breakdown Structure
Name	A WBS Level 3 Element description
Cons	The total extended cost for consumables
Reps	The total extended cost with out credit for reparables
Net Reps	The total extended cost with credit for reparables
Net Total Costs	The sum of cons and net reps costs
Avg Per System	The net total costs divided by the number of systems
Avg Per Mile	The net total costs divided by the activity

Table A-8. FY 95 TOTAL ARMY WORK BREAKDOWN STRUCTURE COSTS ELEMENTS

9.   Five Year Total Army Work Breakdown Structure Costs

This page shows aggregate costs for WBS that represent the total costs for five consecutive fiscal years. The column headings are explained in Table A-8, FY 95 Total Army

Work Breakdown Structure Costs Elements. Similar to the FY 95 Total Army Work Breakdown Structure Costs table, this table adds a row to show the Total for each of the cost columns. Further, two more rows are added at the bottom of the table to show the average cost per system (Avg Per System) and the average cost per mile (Avg Per Mile).

10. FY 95 MACOM/Total Army Class V Costs

The top half of this page shows MACOM Class V (Ammunition) ROUNDS EXPENDED and calculated EXTENDED COSTS. MACOM and Total Army average cost per system are also provided. The lower half of the page shows the costs of different types of ammunition expended as recorded in the Training Ammunition Management Information Systems (TAMIS).   The column headings are explained in Table A-9, FY 95 MACOM/Total Army Class V Costs Elements.

Elements	Explanations	
FY 95 MACOM Class V Costs (top half of page)		
MACOM	Code	Major Army Command-Code
	Name	Major Army Command-Name
Main Rounds Exp	The system main rounds expended as recorded in the Training Ammunition Management Information System (TAMIS)	
Secondary Rounds Exp	The system secondary rounds expended as recorded in the TAMIS	
Extended Costs	The sum of the quantities of main rounds or secondary rounds expended multiplied by the unit price of the round	
Avg Cost Per System	The extended costs divided by the umber of systems	
FY 95 Total Army Class V Costs (bottom half of page)		
DODIC	The Department of Defense Identification Code (DODIC) is a four digit code found in the TAMIS, that identifies types of ammunition	
Nomenclature	Abbreviated item name (i.e., CTG means cartridge)	
Unit Price	The FY 95 DODIC unit price	
Rounds Expended	The expended quantity by DODIC, as recorded in TAMIS	
Extended Costs	The unit price of the round multiplied by the number of rounds expended	
Avg Per System	The extended costs divided by the number of systems	

Table A-9. FY 95 MACOM/TOTAL ARMY CLASS V COSTS ELEMENTS

11. Five Year MACOM/Total Army Class V Costs

This page focuses on MACOM and TOTAL ARMY CLASS V extended costs for five consecutive fiscal years. The top half of the page shows MACOM Class V extended costs. The lower half of the page shows, by DODIC, the types of ammunition recorded in the TAMIS for the specific weapon/materiel system. In addition, extended costs, the fiscal year Total Army costs, and the average cost per system are displayed. The column headings are explained in Table A-10, Five Year MACOM/Total Army Class V Costs.

Elements	Explanations	
Five Year MACOM Class V Costs (top half of page)		
MACOM	Code	Major Army Command-Code
	Name	Major Army Command-Name
FY 91-95 Extended Costs	The sum of the numbers of main and secondary expended rounds multiplied by the unit price of the round	
Five Year Total Army Class V Costs (bottom half of page)		
DODIC	The Department of Defense Identification Code (DODIC) is a four digit code found in TAMIS, that identifies types of ammunition	
Nomenclature	Abbreviated item name (i.e., CTG means cartridge)	
FY 91-95 Extended Costs	The FY unit price of the round multiplied by the number of rounds expended in a specific fiscal year	

Table A-10. FIVE YEAR MACOM/TOTAL ARMY CLASS V COSTS ELEMENTS

12. Top 40 Cost Drivers Class IX Consumables (NON-DLRs)

The NSN-level demands and cost data for the forty consumables having the greatest annual extended costs are displayed on two pages. The consumable costs are calculated by multiplying the annual quantity demanded by the FY 95 AMDF unit price. In the OSMIS process, common parts are allocated across weapon/materiel systems in proportion to their densities; therefore, the quantities of parts shown are not necessarily whole numbers. The column headings, bottom of the page data, and cost elements are explained in Table A-11, Top 40 Cost Drivers Class IX Consumables (Non-DLRs) Elements.

Elements		Explanations
NSN		A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Nomenclature		A brief description of the NSN
WBS		A two or three position alphanumeric code identifying Work Breakdown Structure
MRC		Maintenance Repair Code - A one position code indicating whether the item is to be repaired when unserviceable and the lowest level of maintenance authorized to perform complete repair of the item
ARI		Automatic Return Item - A one position alphabetic code which indicates items in a critical stock position, which must be returned to a designated facility without getting disposition instructions
MATCAT		A five position alphanumeric code that prescribes the Materiel Category structure detail for management of Army inventories
FY 95 AMDF Unit Price		The unit price for a NSN
FY 95 Qty		The quantity (Qty) of demands recorded for a specific NSN
Extended Cost (Qty * Unit Price)		The FY 95 Qty multiplied by the FY 95 AMDF unit price
Average Cost	Per System	The extended cost divided by the number of systems
	Per Mile	The extended cost divided by the miles
Average Quantity	Per 100 Systems	The FY 95 Qty divided by the number of systems and multiplied by 100
	Per 100 Miles	The FY 95 Qty divided by the miles and multiplied by 100
FY 91-95 Five Year Average	Qty	The average NSN quantity demanded over five consecutive fiscal years
	Extended Cost	The FY 91-95 five year average Qty multiplied by the FY 95 AMDF unit price
Number of Systems (bottom of the page)		The Total Army number of systems
Miles (bottom of the page)		The Total Army activity
Top 40 (bottom of the page)		The sum of the cost drivers extended cost
Others (bottom of the page)		The sum of the non-cost drivers extended cost
Total (bottom of the page)		The total extended cost

Table A-11. COST DRIVERS CLASS IX CONSUMABLES (NON-DLRs) ELEMENTS

13.   Top 40 Class IX Cost Drivers Reparables (DLRs)

The NSN-level demands and cost for the forty DLRs with the greatest annual extended costs are displayed on two pages. Reparable costs are calculated by multiplying the FY 95 Quantity (Qty) by the FY 95 AMDF unit price with credit (see Appendix A, paragraph 6 for an explanation of the unit price). In the OSMIS process, common parts are allocated across

weapon/materiel systems in proportion to their densities; therefore the quantities of parts are not necessarily whole numbers. The column headings, bottom of the page data, notes, and cost elements are explained in Table A-12, Cost Drivers Class IX Reparables Elements.

Elements		Explanations
NSN		A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Nomenclature		A brief description of the NSN
WBS		A two or three position alphanumeric code identifying Work Breakdown Structure
MRC		A one position code indicating whether the item is to be repaired when unserviceable and the lowest level of maintenance authorized to perform complete repair of the item
ARI		A one position alphabetic code which indicates items in a critical stock position, which must be returned to a designated facility without getting disposition instructions
MATCAT		A five position alphanumeric code that shows the Materiel Category structure detail for management of Army inventories
FY 95 AMDF Unit Price	Without Credit	The unit price for a NSN
	With Credit	The unit price multiplied by the MSC-specific reparable credit
FY 95 Qty		The quantity of demands recorded for a specific weapon/materiel system
Extended Cost with Credit (Qty * Unit Price)		The FY 95 Qty multiplied by the FY 95 AMDF unit price with credit
Average Cost With Credit	Per System	The extended cost with credit divided by the number of systems
	Per Mile	The extended cost with credit divided by the miles
Average Quantity	Per 100 Systems	The FY 95 Qty divided by the number of systems and multiplied by 100
	Per 100 Miles	The FY 95 Qty divided by the miles and multiplied by 100
FY 91-95 Five Year Average	Qty	The average NSN quantity demanded over five consecutive fiscal years
	Extended Cost With Credit	The FY 91-95 five year average Qty multiplied by the FY 95 AMDF unit price with credit
Number of Systems (bottom of the page)		The Total Army number of systems
Miles (bottom of the page)		The Total Army activity
Top 40 (bottom of the page)		The sum of the cost drivers extended cost with credit
Others (bottom of the page)		The sum of the non cost drivers extended cost with credit
Total (bottom of the page)		The total extended cost with credit

Table A-12. COST DRIVERS CLASS IX REPARABLES ELEMENTS

14. FY 95 Depot/Intermediate Maintenance Costs

The Operation and Maintenance, Army (OMA) and the Defense Business Operating Fund (DBOF) cost data associated with Major Subordinate Command (MSC) depot maintenance activities are shown on the top half of this cost page. Depot end item maintenance costs are OMA expenditures while secondary item costs are DBOF expenditures. Depot maintenance activities for end items are grouped as: repair, overhaul, other, and modification. Those for secondary items are grouped as: repair, overhaul, and other. The Other maintenance category for end items and secondary items may include: conversions, renovation, fabrication/manufacture and maintenance assistance. Sources of maintenance activity costs are listed below:

- the MSC depot Master File Maintenance (MFM) records data for end items and secondary items, and

- the Maintenance Data Management System (MDMS) records MSC contract costs.

Row headings are explained in Table A-13, FY 95 Depot Maintenance Costs Elements.

Elements	Explanations
Civilian Labor	The cost of civilian labor
Military Labor	The cost of military labor
Materiel	The cost of materiel to maintain, modify or rebuild an end item or secondary item
Overhead	The sum of base operating costs and indirect maintenance expenses
Contract	The cost of contractor activities
Other	Not direct labor, materiel, or base operating costs (i.e., travel expenses)
Quantity Completed	The number of end items or secondary items completed during the fiscal year
Average Cost	The total cost divided by the quantity completed

Table A-13. FY 95 DEPOT MAINTENANCE COSTS ELEMENTS

The bottom half of this page identifies intermediate maintenance costs by MACOM and Total Army. The intermediate maintenance data represents military labor hours extracted from the Work Order Logistic File (WOLF). FORSCOM and TRADOC civilian data contain civilian labor hours and labor costs from the Directorate of Logistics (DOL) and other contractor maintenance cost reports. The DOL civilian costs are extracted from WOLF and contractor costs are extracted from separate contractor cost reports. The column headings are explained in Table A-14, FY 95 Intermediate Maintenance Costs Elements.

Elements	Explanations
MACOM	Major Army Command
DS/GS Labor Hours	The military direct labor hours extracted from WOLF
DS/GS Labor Costs	The military labor hours multiplied by the E-5 composite standard rate
Civilian Labor Hours	The total DOL civilian direct labor hours extracted from WOLF and civilian contractor labor hours extracted from contractor provided reports
Civilian Labor Costs	The total DOL civilian direct labor costs extracted from WOLF and civilian contractor labor costs extracted from contractor reports
Civilian Labor Cost/Hour	The civilian labor costs divided by the civilian labor hours for FORSCOM and TRADOC installations only

Table A-14. FY 95 INTERMEDIATE MAINTENANCE COSTS ELEMENTS

15.   Five Year Depot/Intermediate Maintenance Costs

This page shows two tables containing the Total Army depot/intermediate maintenance costs for five consecutive fiscal years. The top half of the page shows depot maintenance costs for end item and secondary item maintenance activities summed by the cost element for five consecutive fiscal years. Similarly, the bottom half shows intermediate maintenance costs for direct support/general Support maintenance activities and civilian maintenance summed at the MACOM level for five consecutive fiscal years.

16.   FY 95 Depot Secondary Item Maintenance - Rebuilds/Overhauls & Repairs Cost Drivers

This page lists secondary item maintenance - rebuilds/overhauls and repairs cost drivers. The MFM contains the secondary item maintenance data recorded at depot level activities. The top half of the page shows the depot maintenance cost drivers for secondary item rebuilds and overhauls. The bottom half of the page shows the depot maintenance cost drivers for secondary item repairs. Table A-15, FY 95 Secondary Item Maintenance - Rebuilds/Overhauls & Repairs Cost Driver Elements, explains the headings in each table shown on top half and the bottom half of the page.

Elements	Explanations
NSN	A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Nomenclature	A brief description of the secondary item
FY 95 AMDF Price	The unit price listed for the secondary item
FY 95 Total Cost to Rebuild/Overhaul or Repair	The costs extracted from the Master File Maintenance (MFM) for the secondary items that were rebuilt/overhauled or repaired
FY 95 Qty Completed	The quantity completed during the fiscal year
Avg Cost to Rebuild/ Overhaul or Repair	The total cost to rebuild/overhaul or repair divided by the quantity completed for each secondary item and then ranked in descending order

Table A-15. FY 95 DEPOT SECONDARY ITEM MAINTENANCE - REBUILDS/OVERHAULS & REPAIRS COST DRIVER ELEMENTS

17. Five Year Depot Secondary Item Maintenance - Rebuilds/Overhauls & Repairs Cost Drivers

This page shows the five year depot secondary item maintenance cost drivers for five consecutive fiscal years. This page contains a list of depot maintenance and repair activities NSN cost drivers for five consecutive fiscal years. The top half of the page shows the depot maintenance cost drivers for secondary item rebuilds and overhauls, and the bottom half of the page shows the depot maintenance cost drivers for secondary item repairs for five consecutive fiscal years. Table A-16, Five Year Depot Secondary Item Maintenance - Rebuilds/Overhauls & Repairs Cost Driver Elements, explains the headings in the tables shown on this page.

Elements	Explanations
NSN	A thirteen position number assigned to each item of supply purchased, stocked, or distributed within the Federal Government
Nomenclature	A brief description of the secondary item
FY 95 AMDF Price	The unit price listed for the secondary item
FY 91-95 Total Cost to Rebuild/Overhaul or Repair	The NSN total costs are extracted from the MFM, escalated for each fiscal year prior to FY 95, and then summed
FY 91-95 Qty Completed	The quantity completed during the fiscal year
Avg Cost to Rebuild/ Overhaul or Repair	The total cost to rebuild/overhaul or repair divided by the quantity completed for each secondary item and then ranked in descending order

Table A-16. FIVE YEAR DEPOT SECONDARY ITEM MAINTENANCE - REBUILDS/OVERHAULS & REPAIRS COST DRIVER ELEMENTS

APPENDIX B

Work Breakdown Structure (WBS)

Artillery/Missiles Systems

Work Breakdown Structure (WBS)

This appendix displays the level 3 and 4 WBS elements as defined within the guidelines provided by USACEAC in Appendix D of the <u>Department of the Army Cost Analysis Manual,</u> dated August 1992. Three different WBS structures are used in the report depending upon the type of system. The table below links the systems within the report to the WBS structure.

Surface Vehicle Systems WBS Structure	
M109A5 HOWITZER	M981 FIST-V
M109A6 PALADIN	M992A1 FAASV
M110A2 HOWITZER	
Ordnance Systems WBS Structure	
M102 TOWED HOWITZER	M163A1 VULCAN
M119A1 TOWED HOWITZER	M167A1 TOWED VULCAN
M198 TOWED HOWITZER	
Missile Systems WBS Structure	
AVENGER	PATRIOT
HAWK	MLRS
M220A2 TOW	AN/UAS-12
M48A2 CHAPARRAL	G/VLLD

Surface Vehicle Systems WBS Structure

For the surface vehicle WBS structure, level 1 identifies the system as a surface vehicle system. Level 2 identifies the system as either a primary vehicle or a secondary vehicle (this report uses the primary vehicle codes). The level 3 code identifies the functional subsystem of the system and the level 4 code identifies the subelements of the subsystem. Systems using the Surface Vehicle Systems WBS includes the M109A5, M109A6, M110A2 HOWITZERs, and the M981 and the M992A1.

Level 3 WBS Code	Level 3 Element (Subsystem)	Level 4 WBS Code	Level 4 Element (Subelement)
01	Hull/Frame		
		01A	Structure
		01B	Accommodations for Subsystem
		01C	Towing and Lifting Fittings
		01D	Bumpers
		01E	Hatches
		01F	Grilles
		01G	Suspension Mountings
		01H	Other
02	Suspension/Steering		
		02A	Wheels
		02B	Tracks
		02C	Steering Gears
		02D	Rudder Thrust Devices
		02E	Trim Vanes
		02F	Springs
		02G	Shocks Absorbers
		02H	Skirts
		02J	Other
03	Power Package/Drive Train		
		03A	Engine
		03B	Engine Mounted Auxiliaries
		03C	Air Ducting
		03D	Manifolds
		03E	Controls and Instrumentation
		03F	Exhaust Systems
		03G	Cooling Means
		03H	Transmission

Level 3 WBS Code	Level 3 Element (Subsystem)	Level 4 WBS Code	Level 4 Element (Subelement)
03	Power Package/Drive Train (continued)		
		03J	Clutches
		03K	Shaft Assemblies
		03L	Torque Converters
		03M	Differentials
		03N	Final Drives
		03P	Power Takeoffs
		03Q	Integral Brakes and Steering
		03R	Other
04	Auxiliary Automotive		
		04A	Vehicle Electrical System
		04B	Fire Extinguisher System
		04C	Controls
		04D	Chassis Mounted Accessories
		04E	Winch and Power Takeoff
		04F	Tools and Equipment
		04G	On Vehicle Materials
		04H	Other
05	Turret Assembly		
		05A	Armor
		05B	Attachments and Appendages
		05C	Hatches
		05D	Cupolas
		05E	Turret Electrical System
		05F	Personnel Accommodations
		05G	Command and Control
		05H	Other
06	Fire Control		
		06A	Radars
		06B	Sensors
		06C	Rendezvous and CTR Tracking
		06D	Displays
		06E	Sights or Scopes
		06F	Computer
		06G	Software
		06H	Other
07	Armament		
		07A	Main Gun
		07B	Launchers
		07C	Secondary Armament
		07D	Other

Level 3 WBS Code	Level 3 Element (Subsystem)	Level 4 WBS Code	Level 4 Element (Subelement)
08	Body/Cab		
		08A	Personnel Accommodations
		08B	Cargo
		08C	Placement of Subsystems
		08D	Other
09	Automatic Loading		
10	Automatic/Remote Piloting		
11	Nuclear, Biological, Chemical		
12	Special Equipment		
		12A	Wrecker Equipment
		12B	Recovery Vehicles
		12C	Field Work Units
		12D	Furnishing and Equipment
		12E	Other
13	Navigation		
14	Communications		
15	Primary Vehicle Applications Software		
16	Primary Vehicle System Software		
17	Integration, Assembly, Test, and Checkout		
		17A	Interface Sections/Material
		17B	Other
18	Other		

Ordnance Systems WBS Structure

For the ordnance systems WBS structure, level 1 identifies the system as an ordnance system. Level 2 identifies the system as either a complete round or a launch system. The level 3 code identifies the functional subsystem of the system. There are no level 4 codes. Systems using the ordnance systems WBS structure include the M102, M119A1, and M198 towed howitzers, the M163A1 VULCAN, and the M167A1 TOWED VULCAN.

Level 3 WBS Code	Level 3 Element (Subsystem)
Complete Round	
01	Structure
02	Payload
03	Guidance and Control
04	Fuze
05	Safety/Arm
06	Propulsion
07	Integration, Assembly, Test, and Checkout
08	Other
Launch System	
20	Launcher
21	Carriage
22	Fire Control Equipment
23	Ready Magazine
24	Adapter Kits
25	Integration, Assembly, Test, and Checkout
26	Other

Missile Systems WBS Structure

For the missile systems WBS structure, level 1 identifies the system as a missile system. Level 2 identifies the system as an air vehicle or command and launch equipment. The level 3 code identifies the functional subsystem of the system and the level 4 code identifies the subelements of the subsystem. Systems using the missile systems WBS structure include the AVENGER, HAWK, M220A2 TOW, M48A2 CHAPARRAL, PATRIOT, MLRS, AN/UAS-12, and G/VLLD.

Level 3 WBS Code	Level 3 Element (Subsystem)	Level 4 WBS Code	Level 4 Element (Subelement)
Air Vehicle			
01	Propulsion		
		01A	Stage I
		01B	Stage II
		01C	Engine
		01D	Integration, Assembly, Test, and Checkout
		01E	Other

Level 3 WBS Code	Level 3 Element (Subsystem)	Level 4 WBS Code	Level 4 Element (Subelement)
02	Payload		
		02A	Warhead
		02B	Shroud
		02C	Integration, Assembly, Test, and Checkout
		02D	Other
03	Airframe		
04	Reentry System		
05	Post Boost System		
06	Guidance and Control Equipment		
		06A	Guidance Section
		06B	Control Section
		06C	Software
		06D	Integration, Assembly, Test, and Checkout
		06E	Other
07	Ordnance Initiation Set		
08	Airborne Test Equipment		
09	Airborne Training Equipment		
10	Auxiliary Equipment		
11	Integration, Assembly, Test, and Checkout		
12	Other		
Command and Launch Equipment			
20	Surveillance, Identification, and Tracking Sensors		
21	Launch and Guidance Control		
22	Communications		
23	Command and Launch Applications Software		
24	Command and Launch System Software		
25	Launcher Equipment		
		25A	Container
		25B	Launch Vehicle/Transporter
		25C	Other
26	Auxiliary Equipment		
27	Integration, Assembly, Test, and Checkout		
28	Other		

APPENDIX C

System Cost Reports By Volume

The preceding document, <u>FY 95 Cost Report, Volume 3 - Artillery/Missile Systems</u>, was produced from the Operating and Support Management Information System (OSMIS) data base. The other six volumes are:

- Volume 1 - Aviation Systems,

- Volume 2 - Combat Systems,

- Volume 4 - Tactical Systems,

- Volume 5 - Engineer/Construction Systems,

- Volume 6a - Communications/Electronics Systems, and

- Volume 6b - Communications/Electronics Systems.

The succeeding tables present the systems featured in Volumes 1, 2, 4, 5, 6a, and 6b.

VOLUME 1 - AVIATION SYSTEMS

System	MDS	Description
Rotary Wing	AH-1 COBRA	Helicopter, Attack
	AH-64A APACHE	Helicopter, Attack
	CH-47D CHINOOK	Helicopter, Cargo
	EH-60A QUICK FIX	Helicopter, Observation
	OH-58A KIOWA	Helicopter, Observation
	OH-58C KIOWA	Helicopter, Observation
	OH-58D KIOWA WARRIOR	Helicopter, Observation
	OH-6A CAYUSE	Helicopter, Observation
	UH-1H IROQUOIS (HUEY)	Helicopter, Utility
	UH-60A BLACK HAWK	Helicopter, Utility
	UH-60L BLACK HAWK	Helicopter, Utility
Fixed Wing	OV-1D MOHAWK	Airplane, Observation
	RV-1D MOHAWK	Airplane, Reconnaissance
	RU-21H GUARDRAIL	Airplane, Utility
	U-21G UTE	Airplane, Utility

VOLUME 2 - COMBAT SYSTEMS

System	MDS	Description
Tanks	M1 ABRAMS	Tank, Main Battle, 105mm
	M1A1 ABRAMS	Tank, Main Battle, 120mm
	M1A2 ABRAMS	Tank, Main Battle, 120mm
	M60A3	Tank, Combat, 105mm
Combat Vehicles	ARMORED VEHICLE LAUNCH BRIDGE (AVLB)	Launch, M60 Series Tank Chassis Transporter
	M2/M3 BFV	Infantry/Cavalry Fighting Vehicle
	M2A2/M3A2 BFV HS	Infantry/Cavalry Fighting Vehicle, High Survivability
	M9 ACE	Armored Combat Vehicle
	M88A1	Recovery Vehicle, Fully Tracked, Medium
	M106A2	Carrier, Mortar, 107mm
	M113A3	Carrier, Personnel
	M548A3	Carrier, Cargo, Fully Tracked, 6 Ton
	M551A1 SHERIDAN	Armored Reconnaissance Airborne Assault Vehicle
	M577A3	Carrier, Command Post
	M578 LRV	Recovery Vehicle, Fully Tracked, Light
	M728 CEV	Combat Engineer Vehicle
	M901A1 ITV	Improved Tow Vehicle
	M973 SUSV	Carrier, Cargo, Tracked, 1½ Ton
	M1059 SMOKE GENERATOR	Carrier, Smoke Generator

VOLUME 4 - TACTICAL SYSTEMS

System	MDS	Description
Truck Systems (less than 2½ ton)	CUCV	Truck, Utility, Tactical
	HMMWV	Truck, Utility, 1¼ Ton
	M997 HMMWV AMBULANCE	Truck, Utility, 1¼ Ton , Ambulance
	M1097 HMMWV HEAVY	Truck, Weapons Carrier, Heavy HMMWV (HHV)
	M151 JEEP	Truck, Utility, ¼ Ton
	M876 TELEPHONE TRUCK	Truck, Cargo, Tactical, 1¼ Ton Telephone Maintenance
Truck Systems (2½ - 5 ton)	M35 TRUCK	Truck, Cargo, 2½ Ton
	M54 TRUCK	Truck, Cargo, 5 Ton
	M809 TRUCK	Truck, Cargo, 5 Ton
	M939 TRUCK	Truck, Cargo, 5 Ton
Truck Systems (greater than 5 ton)	HEMTT TRUCK	Truck, Chassis, 10 Ton
	M911 HET	Truck, Tractor, 10 Ton
	M915 TRUCK	Truck, Tractor, Line-Haul, 20 Ton
	PLS	Truck, Palletized Load System

VOLUME 5 - ENGINEER/CONSTRUCTION SYSTEMS

Systems	MDS	Description
Engineer/Construction Equipment	CAT D5	Tractor, Fully Tracked, Low Speed, Diesel, Light
	CAT D7F	Tractor, Fully Tracked, Low Speed, Diesel, Medium
	CAT D7G	Tractor, Fully Tracked, Low Speed, Diesel, Medium
	CAT D8A	Tractor, Fully Tracked, Low Speed, Diesel, Heavy
	CAT 130GS (GRADER)	Grader, Road, Motorized, Diesel
	CLK 5YD	Loader, Scoop, 5 Yard
	JIC 2YD	Loader, Scoop, 2 Yard
	CAT 621B (SCRAPER)	Scraper, Elevating, Road, Motorized, Diesel
	SEE	Small Emplacement Excavator
Materiel Handling Equipment	CRANE, 7½ Ton	Crane, Wheel Mounted, Hydraulic, Light, 7½ Ton
	CRANE, 20 Ton	Crane, Wheel Mounted, 20 Ton With Boom Crane
	CRANE, 25 Ton	Crane, Wheel Mounted, 25 Ton With Boom Crane
	CRANE, 140 Ton	Crane, Truck Mounted, 140 Ton With Boom & Equipment
	FORKLIFT, VARIABLE REACH, RT	Truck, Forklift, 3 Ton, Variable Reach, Rough Terrain
	FORKLIFT, 6k	Truck, Forklift, 3 Ton
	FORKLIFT, 10k	Truck, Forklift, 5 Ton
Power Generation Equipment	MEP-003A (10 KW GEN)	Generator Set, Diesel Engine, 10 KW
	MEP-005A (30 KW GEN)	Generator Set, Diesel Engine, 30 KW
	MEP-006A (60 KW GEN)	Generator Set, Diesel Engine, 60 KW
	MEP-016B (3 KW GEN)	Generator Set, Diesel Engine, 3 KW
Watercraft Equipment	BOAT BRIDGE	Boat Bridge, Erection, Inboard Engine
	LCM 69 FT	Landing Craft Maintenance, 69'
	LCU	Landing Craft Utility, 115'
	LCU RO/RO	Landing Craft Utility, Roll On Roll Off
Other Equipment	M139 MINE DISPENSER	Dispenser, Mine
	ROWPU	Water Purification

VOLUME 6A - COMMUNICATIONS/ELECTRONICS SYSTEMS

System	MDS	Description
Radios (Portable), and Teletype Shelters	AN/GRC-122	Radio, Teletypewriter Set, Shelter Mounted
	AN/GRC-142	Radio, Teletypewriter Set, Shelter Mounted
	AN/GRC-224	Radio, Set
	AN/PRC-112	Radio Set, Survival
	AN/PRC-119 SINCGARS	Radio Set, SINCGARS, Man Portable
Radio Terminal Sets, Repeaters, and Multichannels, Sets and Shelters	AN/VRC-97 MSE MSRT	Mobile Subscriber Radio-Telephone Terminal
	AN/TRC-112	Radio Terminal Set, Shelter Mounted
	AN/TRC-117(V)	Radio Terminal Set, Shelter Mounted
	AN/TRC-138	Repeater Set, Radio, Line-Of-Sight (LOS), Shelter Mounted
	AN/TRC-151	Radio Terminal Set, Multichannel, Shelter Mounted
	AN/TRC-152	Radio Repeater Set, Radio/Cable Terminal, Shelter Mounted
	AN/TRC-170(V)3	Radio Terminal Set
	AN/TRC-173	Radio Terminal Set, Radio/Cable, Shelter Mounted
	AN/TRC-174	Repeater Set, Radio/Cable Terminal, Shelter Mounted
	AN/TRC-190 MSE LOS	Radio Set, Line-Of-Sight (LOS), Shelter Mounted
	AN/TRC-191 MSE RAU	Radio Access Unit, Multichannel, Shelter Mounted
Switch, Voice and Message Shelters	AN/TTC-39A	Central Office Communications, Automatic, Shelter Mounted
	AN/TTC-46 MSE LEN	Large Extension Node Switch (LENS), Shelter Mounted
	AN/TTC-47 MSE NCS	Node Center Switch (NCS), Shelter Mounted
	AN/TTC-48(V)1 MSE SEN	Small Extension Node Switch (SMENS), Shelter Mounted
	AN/TYC-39	Central Message Switching, Automatic, Shelter Mounted

VOLUME 6B - COMMUNICATIONS/ELECTRONICS SYSTEMS

System	MDS	Description
Maintenance Shops, Communication Centers, and Data Processing Systems	AN/ASM-147C	Electronics, Field Maintenance Shop, Shelter Mounted
	AN/MSC-31	Communications Operations Center, Shelter Mounted
	AN/MSC-32	Communications Operations Center, Shelter Mounted
	AN/MYQ-4	Data Processing System, Automated
Radar Sets	AN/PPS-5	Radar Set, Ground Surveillance, Less Power
	AN/TPQ-36 FIREFINDER	Radar Set, Artillery, Rocket, Mortar
	AN/TPQ-37 FIREFINDER	Radar Set, Artillery
Communication Control Centers	AN/TSQ-84	Communications, Technical Control Center, Shelter Mounted
	AN/TYQ-35 MSE SCC	System Command Center (SCC), Shelter Mounted
Communication Terminals	AN/UGC-74A (COMM TERM)	Communications Terminal
	AN/UXC-7 FAX	Lightweight Digital Facsimile, Transceiver, Low Power
Position Locating Systems and Sets	AN/USQ-70 PADS	Position Azimuth Determining System (PADS)
Fire Direction Systems and Sets	AN/TSQ-138	Trailblazer Master Control Set
	AN/GYK-29 BCS	Battery Computer System, Tactical Fire Direction
Air Traffic Control Systems and Centers	AN/TMQ-31	Meteorological Data System (MDS)
	AN/TSW-7A	Mobile, Tactical Air Traffic Control Center
Communications Intercept Set	AN/GSQ-187	Sensor Mounting Set (SMS)
Multiplexers	TD-1234(P)	Remote Multiplexer Combiner